

What is Claimed is:

- 1 1. A method for protecting and transmitting the side information related to peak-to-
2 average power ratio (PAPR) reduction in a multicarrier system, comprising the steps
3 of:
4 (a) performing multicarrier modulation for the data to be transmitted and generating a
5 data modulated signal, then executing a procedure related to said PAPR reduction;
6 (b) encoding said side information for generating coded side information;
7 (c) allocating a plurality of sub-carriers for transmitting said coded side information;
8 (d) performing multicarrier modulation for said coded side information and
9 generating a side information modulated signal; and
10 (e) attaching said side information modulated signal to said data modulated signal for
11 generating a transmitted signal;
12 wherein said PAPR reduction procedure is based on either the PAPR level of said data
13 modulated signal or that of said transmitted signal.
- 1 2. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 1, wherein said encoding said
3 side information is implemented through an error-correction coding procedure.
- 1 3. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 1, wherein said PAPR
3 reduction procedure is based on either the PAPR level of said data modulated signal
4 or that of said transmitted signal to determine PAPR reduction parameters.
- 1 4. The method for protecting and transmitting the side information related to PAPR

2 reduction in a multicarrier system as claimed in claim 3, wherein said PAPR
3 reduction parameters are said side information.

1 5. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 1, wherein said PAPR
3 reduction procedure is a partial transmit sequence method.

1 6. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 3, wherein said PAPR
3 reduction procedure is based on the PAPR level of said data modulated signal, and
4 said steps (b), (d), and (e) are performed after said PAPR reduction parameters have
5 been determined.

1 7. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 4, wherein said PAPR
3 reduction procedure is based on the PAPR level of said data modulated signal, and
4 said steps (b), (d), and (e) are performed after said PAPR reduction parameters have
5 been determined.

1 8. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 3, wherein said PAPR
3 reduction procedure is based on the PAPR level of said transmitted signal, and said
4 steps (b), (d), and (e) are performed during said PAPR reduction procedure.

1 9. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 4, wherein said PAPR
3 reduction procedure is based on the PAPR level of said transmitted signal, and said

4 steps (b), (d), and (e) are performed during said PAPR reduction procedure.

1 10. A method for protecting and transmitting the side information related to peak-to-
2 average power ratio (PAPR) reduction in a multicarrier system, comprising the steps
3 of:

4 (a) performing multicarrier modulation for the data to be transmitted and generating a
5 data modulated signal, then executing a procedure related to said PAPR reduction;

6 (b) encoding said side information and generating two groups of coded side
7 information;

8 (c) allocating two groups of a plurality of sub-carriers for transmitting said two
9 groups of coded side information respectively;

10 (d) combining one of said two groups of coded side information with said data
11 modulated signal;

12 (e) modulating the other group of said two groups of coded side information and
13 generating a side information modulated signal; and

14 (f) attaching said side information modulated signal to said data modulated signal for
15 generating a transmitted signal;

16 wherein said PAPR reduction procedure is based on either the PAPR level of said data
17 modulated signal or that of said transmitted signal.

1 11. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 10, wherein said said step (b) is
3 implemented through an error-correction coding procedure and a parity-bit generation
4 procedure.

1 12. The method for protecting and transmitting the side information related to PAPR

2 reduction in a multicarrier system as claimed in claim 10, wherein said PAPR
3 reduction procedure is based on either the PAPR level of said data modulated signal
4 or that of said transmitted signal to determine PAPR reduction parameters.

1 13. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 12, wherein said PAPR
3 reduction parameters are said side information.

1 14. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 10, wherein said PAPR
3 reduction procedure is a partial transmit sequence method.

1 15. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 12, wherein said PAPR
3 reduction procedure is based on the PAPR level of said data modulated signal, and
4 said steps (b), (e), and (f) are performed after said PAPR reduction parameters have
5 been determined.

1 16. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 13, wherein said PAPR
3 reduction procedure is based on the PAPR level of said data modulated signal, and
4 said steps (b), (e), and (f) are performed after said PAPR reduction parameters have
5 been determined.

1 17. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 12, wherein said PAPR
3 reduction procedure is based on the PAPR level of said transmitted signal, and said

4 steps (b), (e), and (f) are performed during said PAPR reduction procedure.

1 18. The method for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 13; wherein said PAPR
3 reduction procedure is based on the PAPR level of said transmitted signal, and said
4 steps (b), (e), and (f) are performed during said PAPR reduction procedure.

1 19. An apparatus for protecting and transmitting the side information related to peak-to-
2 average power ratio (PAPR) reduction in a multicarrier system, comprising:
3 a multicarrier modulator for modulating data onto multiple sub-carriers and
4 generating a data modulated signal, wherein said multicarrier modulator comprises a
5 PAPR reduction device to reduce the PAPR level of said data modulated signal and
6 reserves a plurality of sub-carriers for protecting and transmitting said side
7 information;
8 a side information coding and modulation device for coding and modulating said side
9 information onto said plurality of sub-carriers and generating a side information
10 modulated signal;
11 a composer for composing said data modulated signal and said side information
12 modulated signal, and generating a transmitted signal; and
13 a parameter control device for PAPR reduction for determining said side information
14 according to the PAPR level of said data modulated signal.

1 20. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 19, wherein said parameter
3 control device for PAPR reduction generates PAPR reduction parameters, and said

4 PAPR reduction parameters are said side information.

1 21. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 20, wherein said multicarrier
3 modulator generates said data modulated signal according to said PAPR reduction
4 parameters and feedback to said parameter control device for PAPR reduction.

1 22. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 19, wherein said parameter
3 control device for PAPR reduction determines said PAPR reduction parameters
4 according to a PAPR reduction procedure, then said side information coding and
5 modulation device refers to said PAPR reduction parameters as said side information
6 for coding and modulating said side information onto said plurality of sub-carriers.

1 23. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 19, wherein said parameter
3 control device for PAPR reduction determines said PAPR reduction parameters after
4 phase optimization, and sends said PAPR reduction parameters to said side
5 information coding and modulation device.

1 24. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 23, wherein said parameter
3 control device for PAPR reduction comprises a phase mapper and a phase
4 optimization unit, and said phase mapper provides said PAPR reduction parameters
5 for said multicarrier modulator.

1 25. The apparatus for protecting and transmitting the side information related to PAPR

2 reduction in a multicarrier system as claimed in claim 24, wherein said phase mapper
3 is implemented by an encoder and an M-ary phase-shift keying (PSK) mapper, and
4 said encoder is followed by said M-ary PSK mapper and proceeds the error-correction
5 coding of said PAPR reduction parameters.

1 26. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 25, said side information
3 coding and modulation device further comprising:
4 a parity-bit generator for coding the output from said encoder and generating an
5 encoded codeword;
6 a symbol mapper for mapping the encoded codeword from said parity-bit generator to
7 a corresponding sequence; and
8 a partial N-point Inverse Fast Fourier Transform (N-IFFT) for performing the
9 modulation of N-IFFT according to the frequency arrangement of said corresponding
10 sequence and generating said side information modulated signal.

1 27. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 19, said side information
3 coding and modulation device further comprising:
4 an encoder for coding said side information from said phase optimization unit and
5 generating an encoded codeword;
6 a symbol mapper for mapping the encoded codeword from said encoder to a
7 corresponding sequence; and
8 a partial N-point Inverse Fast Fourier Transform (N-IFFT) for performing the

9 modulation of N-IFFT according to the frequency arrangement of said corresponding
10 sequence and generating said side information modulated signal.

1 28. An apparatus for protecting and transmitting the side information related to peak-to-
2 average power ratio (PAPR) reduction in a multicarrier system, comprising:

3 a multicarrier modulator for modulating data onto multiple sub-carriers and
4 generating a data modulated signal, wherein said multicarrier modulator comprises a
5 PAPR reduction device to reduce the PAPR level of said data modulated signal and
6 reserves a plurality of sub-carriers for protecting and transmitting said side
7 information;

8 a side information coding and modulation device for coding and modulating said side
9 information onto said plurality of sub-carriers and generating a side information
10 modulated signal;

11 a composer for composing said data modulated signal and said side information
12 modulated signal, and generating a transmitted signal; and

13 a parameter control device for PAPR reduction for determining said side information
14 according to the PAPR level of said transmitted signal.

1 29. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 28, wherein said parameter
3 control device for PAPR reduction generates PAPR reduction parameters, and said
4 PAPR reduction parameters are said side information. .

1 30. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 29, wherein said multicarrier

3 modulator generates said data modulated signal according to said PAPR reduction
4 parameters.

1 31. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 28, wherein said parameter
3 control device for PAPR reduction determines said PAPR reduction parameters
4 according to a PAPR reduction procedure, and during that time, said side information
5 coding and modulation device refers to said PAPR reduction parameters as said side
6 information for coding and modulating said side information onto said plurality of
7 sub-carriers.

1 32. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 28, wherein said parameter
3 control device for PAPR reduction selects said PAPR reduction parameters during
4 phase optimization, and sends said PAPR reduction parameters to said side
5 information coding and modulation device.

1 33. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 32, wherein said parameter
3 control device for PAPR reduction comprises a phase mapper and a phase
4 optimization unit, and said phase mapper provides said PAPR reduction parameters
5 for said multicarrier modulator.

6 34. The apparatus for protecting and transmitting the side information related to PAPR
7 reduction in a multicarrier system as claimed in claim 33, wherein said phase mapper
8 is implemented by an encoder and an M-ary phase shift keying (PSK) mapper, and
9 said encoder is followed by said M-ary PSK mapper and proceeds the error-correction

10 coding of said PAPR reduction parameters.

1 35. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 33, said side information
3 coding and modulation device further comprising:

4 a parity-bit generator for coding the output from said encoder and generating an
5 encoded codeword;

6 a symbol mapper for mapping the encoded codeword from said parity-bit generator to
7 a corresponding sequence; and

8 a partial N-point Inverse Fast Fourier Transform (N-IFFT) for performing the
9 modulation of N-IFFT according to the frequency arrangement of said corresponding
10 sequence and generating said side information modulated signal.

1 36. The apparatus for protecting and transmitting the side information related to PAPR
2 reduction in a multicarrier system as claimed in claim 28, said side information
3 coding and modulation device further comprising:

4 an encoder for coding said side information from said phase optimization unit and
5 generating an encoded codeword;

6 a symbol mapper for mapping the encoded codeword from said encoder to a
7 corresponding sequence; and

8 a partial N-point Inverse Fast Fourier Transform (N-IFFT) for performing the
9 modulation of N-IFFT according to the frequency arrangement of said corresponding
10 sequence and generating said side information modulated signal.

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